R. Ross. With the author's compliments.

The Best Antimalarial Organization for the Tropics.

By

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Liverpool.

Separat-Abdruck aus

Malaria.

Band I. Heft 2.

1909.

Leipzig,
Johann Ambrosius Barth.
Dörrienstraße 16.

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The Best Antimalarial Organization for the Tropics.

By

Ronald Ross, Liverpool.

Several correspondents have recently asked me to give them my views upon this important subject; and I therefore think that an article on it may prove useful to practical sanitarians.

In the first place we should note that in public hygiene, organisation is of supreme importance. Without it, the most rational sanitary ideals are apt to remain sterile; and, indeed the history of sanitation gives many examples of this fact. Secondly we must understand that antimalarial organisation must differ largely from place to place, according to the race of the inhabitants, the mode of government, the climate, and so on. We have seen the great work performed by such sanitary statesmen as Celli in Italy and Gorgas in Panama; but it does not follow that the organisation used by them will always necessarily be the best one for the rest of the world. In Italy there is a white population, possessing considerable wealth and influenced by many well educated medical men scattered among them. In Panama, antimalarial measures have behind them the immense resources of the American State; and in Ismailia the operations, inexpensive as they were, were supported by the wealthy Suez Canal Company. But in the vast majority of smaller tropical colonies, towns, villages, and rural areas, no such conditions exist, and the sanitarian is compelled to rely almost entirely on his own efforts and on such small doles of money as can be alotted to him out of the public funds. Under such cirsumstances it becomes a very nice question to select, not merely a good antimalarial organisation, but the best than can be devised for the money available. The organisation suggested below has been based upon a long study of the question, accompanied by personal experience, in India, West Africa, Panama, Egypt and Mauritius. It was especially in the last named colony that the organisation has been evolved, during a recent mission of mine there, on behalf of the Government, to advise on the best method of dealing with the disease; and I may add that in evolving it I was largely assisted by the able public officers and the highly intelligent people of that interesting and beautiful island.

I. I will suppose that the local government, whatever it may be, has decided to conduct special measures against malaria. In this case it should understand clearly to begin with that the measures must be conducted indefinitely, and will always be a source of considerable expense. It is true that as the disease is reduced, the expenses of the organisation may also diminish; but, if a permanent reduction of the former is required, the latter can never disappear entirely. At the same time the local government should apprehend

that this expense is likely to be largely recouped by the public. In many tropical countries malaria causes quite one third of the total amount of sickness; necessitates a much larger hospital staff than would otherwise be required; demands large expense for medical attendance, invaliding and pensioning; often paralyses administration by the sickness and death of officials; is a great source of expense to planters and cultivators owing to the loss of labour involved; and generally impairs the health and efficiency of the whole people. It is therefore always as good economy to spend money on the prevention of malaria, as it is for a single individual who is suffering from any disease to pay money for medical advice.

II. These points having been considered, the first essential is to appoint a proper official to supervise the entire antimalarial operations. The status and pay of this official must depend upon the extent of the operations. If it is proposed to adopt general measures throughout a whole colony, the official must be of correspondingly high status, but if the measures apply only to a small town or rural area, the official may be a subordinate with a small salary. In both cases this officer must have, or must be given, a full knowledge of the subject; and in both cases he must be subordinate to the principal local medical authority. I do not propose that he shall be in any way independent of the latter, but only that the general direction of the antimalarial measures shall be in his hands, subject to the control of the local medical sanitary chief. For operations of any extent, he must be a fully qualified medical or sanitary officer, or at least a trained entomologist. In the case of small areas, a reliable subordinate can be appointed for this purpose under the local health officer, whoever he may be. The principal point to remember is however, that the antimalarial organisation always requires a special head. Without this, as experience has proved, the measures will often prove to be faulty, expensive, and useless, and will generally be abandoned after a year or two. In fact I have now concluded that this official is quite indispensable for the required purpose.

III. The next thing after making this appointment is to organise a proper "malarial census"—that is to say, to make an accurate estimate of the amount of the disease in the area of operations. We should also understand that this census must be carried out not only to begin with, but at regular intervals. If we commence or continue the operations without estimating the amount of the disease present, the result of them will never be accurately known; the Government will not know what benefit it is receiving for the money which it expends; and the funds may thus often be discontinued. In my report on the Prevention of Malaria in Mauritius (now published by Messrs. J. and A. Churchill, London, on behalf of the British Colonial Office), the question of how best to make the malaria census is discussed in full (pages 65 and 104). On the whole I depend most upon the periodical examination of school children for enlargement of spleen. The results are likely to be sufficiently safe if there is no kala-azar in the locality; and even if there is, unless it is extremely prevalent, the majority of cases of enlargement of spleen are

likely to be due to malaria; so that the figures will not be very greatly vitiated. Children in schools may be examined at the rate of about one hundred in the hour; and the ratio of those with enlarged spleen to the whole number examined gives a very good index of the amount of malaria present. The examination of the blood for parasites, is, as a practical measure, almost out of the question, owing to the length of time occupied for each specimen. Obviously we have to avoid statistical error, which means that large numbers of observations must be made, and this demands an easy though somewhat inaccurate test in preference to an accurate but difficult one. Of course, to be reliable, the spleen census must be made as large as possible, and this cannot possibly be done merely by the head of the malaria organisation alone. In fact the head of the medical department must issue orders to all medical officers under him to assist, at least once a year, in the work. In Mauritius, the sanitary wardens and medical officers examined 31022 children in the space of a few weeks and found that 10595 of them had enlargement of the spleen (34,1 %). It will be the duty of the head of the malarial organisation to collect the statistics so obtained; to compare them year by year, and to note those localities where the disease is increasing or decreasing. Experience shows me more and more that this malaria census is as necessary to the success of the organisation as any other measure is likely to be.

IV. With regard to the distribution of quinine, I conclude that it is most economically given to school children who are actually suffering from fever or enlargement of the spleen. The organisation which I have recommended for Mauritius is as follows: Every school is to be visited once in three months by a medical man, who examines all children present on each occasion and records the names of those suffering from malaria in a register kept for the purpose by the school master. He also indicates the doses of quinine which are to be given to each of these children. During the three months following his visit, the school master carries out his instructions by administering the drug to the child as directed. At his next visit the medical officer decides whether the medicine is to be continued or not. Obviously the register of infected children at the school serves as a basis, not only for treatment by quinine, but also for the malaria census; and at the end of the year the medical man attending each school reports to the head of the malaria organisation his opinions as to the increase or decrease of the disease at the school referred to. In this way the schools serve a double purpose, namely for measuring the amount of malaria present in the locality and also for treating the principal sources of infection, the native children. I advocate that the drug be administered only to children who are or may be infected, and not to the healthy children; because, if the latter is done, parents often take objection, and it is clearly necessary not to incur public opposition to such measures. In addition to such distribution of free quinine to the schools, I also recommend that a number of qualified apothecaries be appointed to give the drug gratis in badly infected villages. These men should be provided with wallets containing quinine pills or similar preparations in convenient doses and in sufficient quantity for

the day's use. Each man is directed to travel from house to house, to examine the children and adults where this is permitted, and to distribute the drug to those who will accept it. I advise that each person who accepts it, shall be given enough to take for at least two weeks; so that the apothecary need visit each house only twice a month. I advise also that any persons suffering from malaria who visit the public dispensary should be given sufficient quinine for that period also; because at present they are given enough only for two or three days, which necessitates the patient returning to the dispensary very frequently—a thing which the poor, who have their business to attend to, are not always able to do. The same thing must also be done in the hospitals and dispensaries of plantations and factories. As a general rule with regard to the distribution of quinine, I conclude that it should be given principally to those already suffering from fever or enlargement of the spleen, and that attempts to issue it for purely prophylactic purposes in the tropics will add largely to the expense of distribution without meeting with corresponding success. The medical department ought to maintain special apothecaries for the preparation of pills and similar forms of quinine for distribution, which will of course be required in large numbers if this part of the organisation is developed. On the whole I much prefer for public distribution freshly made pills to powders and solutions. There are may excellent preparations on the market for this purpose, but as a rule in the tropics their price is against them.

V. With regard to the protection of houses with wire gauze, I think that this for the tropics must be generally recommended only for public institutions, such as barracks, hospitals, asylums, jails. We must however remember that the cost is very considerable in the tropics, and that there always is the question whether the money had not better be distributed for anti-mosquito work in the neighbourhood of such institutions. The cost of protecting a single hospital with wire gauze is often sufficient to drain a large area around it. The protection of the poorer class of houses in the tropics is almost impossible, as the cost of the gauze will often exceed the value of the house. In fact such houses, being often made merely of bamboo or wood full of numerous interstices, cannot generally be protected without being covered entirely with the gauze. Moreover the avocations of the poor in the tropics continually compels them to work out of doors in the evening. For Mauritius I recommended that an effort should be made to design a method of protection for the houses of natives living near large marshes, but I have doubts whether any practical design can be made for this purpose.

VI. With regard to anti-mosquito work, the organisation is as follows: A number of men, whom we called "Moustiquiers" in Mauritius, are appointed under the head of the malaria organisation. These men are intelligent natives receiving a small salary. They are carefully trained by him in all the important points connected with the habits and breeding places, and the different kinds of the local mosquitoes; and after such training each man is allotted a tract of country in which his duties will be performed. These duties consist in finding the breeding places of the mosquitoes, in distributing quinine, in

reporting bad cases of malaria, and in watching the work of the "malaria gangs". In Mauritius we trained 10 such men in a few weeks, and their services proved quite invaluable. They become the principal lieutenants of the head of the malaria organisation.

The actual antimosquito work is done by a number of workmen called "malaria gangs". I think that the best organisation is as follows:—Each malaria gang consists of three men, one of whom is the head man, and the other two are his assistants. To each gang an area of several square miles (219 hectares) is alotted; and it is its duty to prevent the breeding of mosquitoes within that area by the methods now so well known. The head man receive a little more salary than the other workmen. If possible all of them should be permanently employed on the work, as they generally become skilled labourers. During the rainy season they are employed chiefly in preventing the breeding of Anophelines, but during the cool or dry season their services can be largely used against Culex and Stegomyia, and for other sanitary work. For the whole of Mauritius which contains 373000 people, I proposed the appointment of 109 of these gangs, consisting of 327 men. This however was only for the anti-mosquito work in the towns and villages, that of the sugar estates being performed by the labourers on those estates. As already mentioned it is the duty of the moustiquiers to maintain a surveillance over the work of the gangs.

These workmen will almost always be intelligent natives who are already acquainted with agricultural labour. They will attend almost entirely to what I call "minor" mosquito works, that is the work of clearing small water channels, filling up small pools, removal of breeding places round houses, and so on. The "major" works, which consist in drainage or bonification of large marshes, or the margins of rivers and lakes, must be done by the engineering department of the colony. But I wish to advocate the general rule contained in the words minor works before major works. That is to say, I dislike to involve the colony in the large expense required for the major works, until it has been shown clearly that the minor works in these cases are insufficient. I have frequently noted that what appears to be a large marsh, apparently requiring draining by expensive cuttings, can often be drained very cheaply and easily by a few labourers, such as the malaria gangs. This principal must be strongly advocated. Nothing more alarms colonial governments than demands for them to spend large capital sums of money on major works. Small works which can be done quite inexpensively often suffice. Another general rule is that antimosquito work is called for most in the most densely populated areas, while in sparsely populated areas quinine or house protection must generally suffice.

VII. Every year the head of the malaria organisation should prepare a report to the head of the medical or sanitary department, giving exact details of the amount of malaria present, its decrease or increase, the number of men employed, the amount of quinine distributed, and the whole expense of the work. This report, which costs little, is another essential of the campaign.

It will thus be seen that the antimalarial measures which are actually feasible in the tropics are limited only to a few. The total cost is not much. Thus for Mauritius I have asked for only Rs. 135000 (about £ 9000) per annum, in addition to any expense which may be incurred upon the major works, on which I have not insisted much at present. The area of Mauritius is 705 square miles. It contains 373000 people, mostly Indians, and 93000 houses. The annual revenue of the colony amounts to about Rs. 11000000, of which Rs. 75000 are now spent by the medical department — so that the antimalaria campaign will cost only about one sixth of the annual medical budget, although the disease causes more than one third of the total illness.

For further details, which cannot be given except at considerable length, I should like to refer the reader to my report on Malaria in Mauritius already referred to. In my opinion there is no longer any call for much local investigation with regard to the disease. We already have sufficient knowledge of it to undertake its prevention on a large scale; and for this organisation only is necessary. Where funds will not allow of the adoption of the full organisation as briefly outlined above, much good may yet be done by more partial operations, especially in the principal towns and villages.

Auszug.

Die Maßregeln gegen die Malaria müssen je nach dem Lande und den zur Verfügung stehenden Mitteln verschieden sein.

1. Wo man gegen die Malaria mit Erfolg vorgehen will, muß man sich darüber klar sein, daß der Kampf ein dauernder und kostspieliger ist. Die Ausgaben vermindern sich aber mit dem fortschreitenden Erfolge und sind stets geringer als die Unkosten, welche die Krankheit selbst dem einzelnen Menschen und der Gesamtheit auferlegt. 2. Die Malariabekämpfung muß einem besonderen Beamten, am besten einem Arzte oder Entomologen, welcher der Gesundheitsbehörde untersteht, übertragen werden. Nur bei kleinem Wirkungskreise ist ein Unterbeamter zulässig. 3. Die erste Aufgabe ist, die Verbreitung der Malaria festzustellen. Falls keine Kála-Azar vorkommt, gibt das Vorkommen von Milzschwellung bei Schulkindern den besten Anhaltspunkt; Blutuntersuchung ist zu zeitraubend. Zu diesem Malariazensus sind nötigenfalls ärztliche Hilfskräfte hinzuzuziehen. 4. Den Schulkindern, welche bei alle drei Monate einmal stattfindender ärztlicher Untersuchung an Fieber oder Milztumor leidend gefunden werden, verordnet der Arzt Chinin. Der Lehrer überwacht die Ausführung der ärztlichen Verordnungen und führt ein Krankenbuch. In den Ortschaften und auf den Pflanzungen wird Chinin in geeigneter Dosierung durch Apotheker alle 14 Tage umsonst verteilt. 5. Nur öffentliche Gebäude werden mückendicht abgeschlossen, da es unmöglich ist, alle Häuser, besonders die Hütten der ärmeren Volksklassen abzudichten und die für ein Haus erforderliche Summe ausreicht, um weite Landstrecken trocken zu legen. 6. Die Mückenvernichtung erfolgt durch besondere aus intelligenten Eingeborenen gebildete Moskitoabteilungen, welche je drei Mann stark ein Gebiet von 219 Hektar reinigen. 109 solche Abteilungen genügen für ganz Mauritius. Entwässerungsarbeiten unter Leitung von Technikern gehen nebenher. Die Kleinarbeit ist jedoch zunächst das wichtigste. 7. Alljährlich liefert der Leiter der Malariaorganisation der obersten Gesundheitsbehörde einen alle Einzelheiten der geleisteten Arbeiten und ihre Kosten umfassenden Bericht.

Verlag von JOHANN AMBROSIUS BARTH in LEIPZIG.

Lehrbuch
der
Kinderheilkunde
von
Dr. O. Heubner
Professor an der Universität Berlin.

2 Bände. Lex. 8°. 2. Auflage 1906.
M 31.—; geb. *M* 36.—.

Band I: [VIII, 716 S. mit 47 Abb. im Text u. a. 1 Tafel.] 1906. *M* 17.—, geb. *M* 19.50.

Band II: [VIII, 568 S. mit 30 Abb.] 1906. *M* 14.—, geb. *M* 16.50.

Monatsschrift für Kinderheilkunde: Das vorliegende Werk stützt sich auf langjährige Erfahrung und Beobachtung, auf ein „kleines Archiv von Kinderkrankengeschichten" und ist von langer Zeit her sorgfältig vorbereitet. Gerade dadurch, dafs in jedem einzelnen Abschnitte die eigene Erfahrung und Forschung des Verfassers zutage tritt, wird das Buch für jeden Arzt und Forscher eine Fülle von Anregung bringen, wie die klare Darstellung des tatsächlich Erforschten und die gesunde Kritik gegenüber dem noch Zweifelhaften es zu einem ausgezeichneten Lehrbuch für den Studierenden bestimmt.

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The Lancet: We can only say that if the succeeding volumes maintain the standard of excellence of the first the student of tropical medicine is to be congratutaled.

Immunität, Schutzimpfung und Serumtherapie
von Oberstabsarzt Prof. Dr. **A. Dieudonné.**
5., umgearbeitete Auflage.
VIII, 234 Seiten. 1908.
brosch. *M* 6.80, geb. *M* 7.80.

Hygienische Rundschau. In 4 Abschnitten bespricht das Buch die natürliche Resistenz (angeborene Immunität), die natürlich erworbene Immunität, die künstlich erworbene Immunität (Schutzimpfung) und die Blutserumtherapie. Die weitere Gliederung der 4 Kapitel ist übersichtlich und klar. Die Auswahl der abgehandelten Materien ist durchweg eine glückliche, Wichtiges ist nirgends übersehen worden. Die Darstellung ist bündig und überall, trotz der oft großen Kompliziertheit der Verhältnisse, leicht verständlich. Seinen Zweck, einen den Fragen der Immunität ferner stehenden Leser schnell mit allem Wichtigen und Wissenswerten über dieselben bekannt zu machen, erfüllt das Werk in vollkommenster Weise.

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Diagnostisch-therapeutisches Vademecum
für Studierende und Ärzte zusammengestellt
von
San.-Rat Dr. Heinrich Schmidt,
Dr. A. Lamhofer, Dr. L. Friedheim,
Dr. J. Donat
in Leipzig.
8. Auflage.
VII und 430 S. Taschenformat. 1908. Mit Abbildungen. Geb. M. 6.—, geb. und mit Schreibpapier durchschossen *M* 7.—.

Das Erscheinen von acht starken Auflagen innerhalb weniger Jahre dürfte am besten für die praktische Brauchbarkeit des kleinen Werkchens sprechen.

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